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METERING DEVICE

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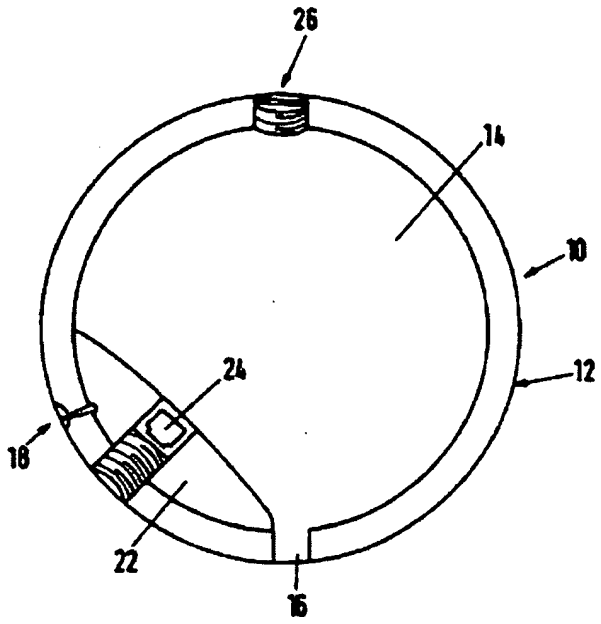
(57) Abstract

A metering device for metering preferably liquid detergent from a container into a mixing chamber, especially the detergent container of a washing machine, in which the metering device contains, in a liquid-proof housing insertable into a washing bath, the container, a metering device for the container, a sensor device to determine the concentration of detergent in the washing bath, a control device downstream of the sensor for the detergent concentration and a power supply device.



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The present invention concerns a metering device for metering preferably liquid detergent from a container into a mixing chamber, especially the detergent container of a washing machine.

For conventional washing machines, a detergent, e.g., in liquid form, is metered into the washing bath from a container, e.g., a pouring container for detergent. The metering of the detergent is performed beforehand by filling a certain amount of liquid detergent into the pouring container; thus, during the washing the amount cannot be adjusted to the actual required detergent amount. If too much detergent is used, part of the excess detergent finds its way, e.g., into textiles, which can lead to skin irritation and deterioration of the textiles, and the other part of the excess goes into the discharge water and pollutes the environment. If too little detergent is used, then the textiles are inadequately cleaned.

The present invention is thus based on the task of disclosing a metering device that enables automatic detergent metering dependent on the amount and the contamination degree of the articles to be washed.

According to the invention, this task is solved in that the metering device includes, in a fluid-tight housing that can be introduced into a washing bath, the components:

- the container;
- a metering device assigned to the container;
- a sensor device for determining the detergent concentration in the washing bath;
- a regulating device for the detergent concentration connected after the sensor device; and
- a power supply device.

Here, the metering device can be provided with a valve.

Further, the metering device can also be provided with a pump.

In a special embodiment of the invention, the sensor device can include a sensor for measuring the pH value of the washing bath.

Advantageously, the sensor device also includes a sensor for measuring the conductivity of the washing bath.

In an especially preferred embodiment, the sensor device also includes a sensor for measuring the temperature of the washing bath.

In addition, the sensor device can include a sensor for measuring the concentration of a substance present in the detergent introduced into the washing bath.

Preferably, the regulating device includes an electrically operated measured-value amplifier, as well as a comparator for an actual-value comparison.

Favorably, the power supply device includes at least one battery.

Furthermore, the power supply device can include at least one thermoelement for supplying power.

In addition, the power supply device can include a mechanical, swinging armature generator.

In addition, the metering device can include a device for determining water hardness.

Finally, the housing can be spherical in form.

The invention is based on the surprising realization that through the arrangement and connection of a sensor device to a regulating device and a metering device according to the invention, a compact metering device is realized, with which the detergent concentration can be determined and, as a function of this value, a metering of the detergent can be performed directly in a mixing chamber or in the area of this chamber. Because the metering device is both mechanically moved and also usually heated in the washing bath, through the use of a thermoelement or the like or a mechanical, swinging armature generator, its own power supply can be realized, i.e., without the use of batteries.

A sensor device with sensors for combined measurement of pH value, conductivity, and temperature of the washing bath offers especially good regulation possibilities since both the pH value and the conductivity depend relatively strongly on the surfactant content and are thus especially suitable for determining the detergent concentration by consideration of the temperature.

With the use of a device for determining the water hardness, the basic need for more or less detergent can also be considered relative to a high or low water hardness.

If a special detergent, which contains a pilot substance (indicator), is used, then the detergent concentration can be measured continuously by its concentration in the washing bath.

Additional features and advantages of the invention result from the following description, in which an embodiment is explained in more detail with reference to the schematic drawing.

The figure shows an embodiment of the metering device according to the invention. The metering device 10 has a spherical housing 12 made of plastic. The housing 12 has a threaded seal 26 for filling detergent in a container 14 and a valve device 16 as a metering device for the detergent. The housing 12 further has a recess for a pH value measurement electrode 18 and a compartment that can be screwed in for a battery 24 for power supply. The pH value measurement electrode 18 is used to determine the detergent concentration indirectly by means of the pH value of the washing bath. All elements (26, 18, 24) are arranged such that they do not project past the peripheral contour of the housing 12. In addition to the power supply device 24, there is a regulating device 22 that includes an electrically operated measured value amplifier, as well as a comparator for actual value comparison, and controls the valve 16 in order to guarantee that the detergent is released into the washing bath only in metered form depending on the pH

value of the washing bath measured by the pH measurement electrode 18, so that the total pH value of the washing bath can be held at a preset desired value. If the pH value (actual value) of the washing bath measured by the pH measurement electrode 18 falls in the direction of the acid range, when, e.g., too little detergent is present for a certain contamination portion due to the articles to be washed, then the valve 16 is opened by the regulating device 22 and directs additional detergent into the washing bath.

The "metering ball" 10 is filled according to need with detergent before each washing process and preferably inserted into a detergent container of a washing machine. In order to consider the water hardness for detergent metering, the metering device 10 can also have a device for determining the water hardness (not shown).

The features of the invention presented in the preceding description, in the drawing, and also in the claims can be considered essential both individually and also in arbitrary combinations for the realization of the invention in different embodiments.

Claims

1. Metering device for metering preferably liquid detergent from a container into a mixing chamber, especially the detergent container of a washing machine, characterized in that the metering device (10) includes, in a liquid-tight housing (12) that can be introduced into a washing bath, the components:

- the container (14);
- a metering device (16) assigned to the storage container (14);
- a sensor device (18) for determining the detergent concentration in the washing bath (20);
- a regulating device (22) for the detergent concentration connected after the sensor device (18); and
- a power supply device (24).

2. Metering device according to Claim 1, characterized in that the metering device (16) includes a valve.

3. Metering device according to Claim 1 or 2, characterized in that the metering device (16) includes a pump.

4. Metering device according to one of the preceding claims, characterized in that the sensor device (18) includes a sensor for measuring the pH value of the washing bath.

5. Metering device according to Claim 4, characterized in that the sensor device (18) also includes a sensor for measuring the conductivity of the washing bath.

6. Metering device according to Claim 5, characterized in that the sensor device (18) also includes a sensor for measuring the temperature of the washing bath.

7. Metering device according to one of the preceding claims, characterized in that the sensor device (18) includes a sensor for measuring the concentration of a substance present in the detergent introduced into the washing bath.

8. Metering device according to one of the preceding claims, characterized in that the regulating device (22) includes an electrically operated measured value amplifier and also a comparator for an actual value comparison.

9. Metering device according to one of the preceding claims, characterized in that the power supply device (24) includes at least one battery.

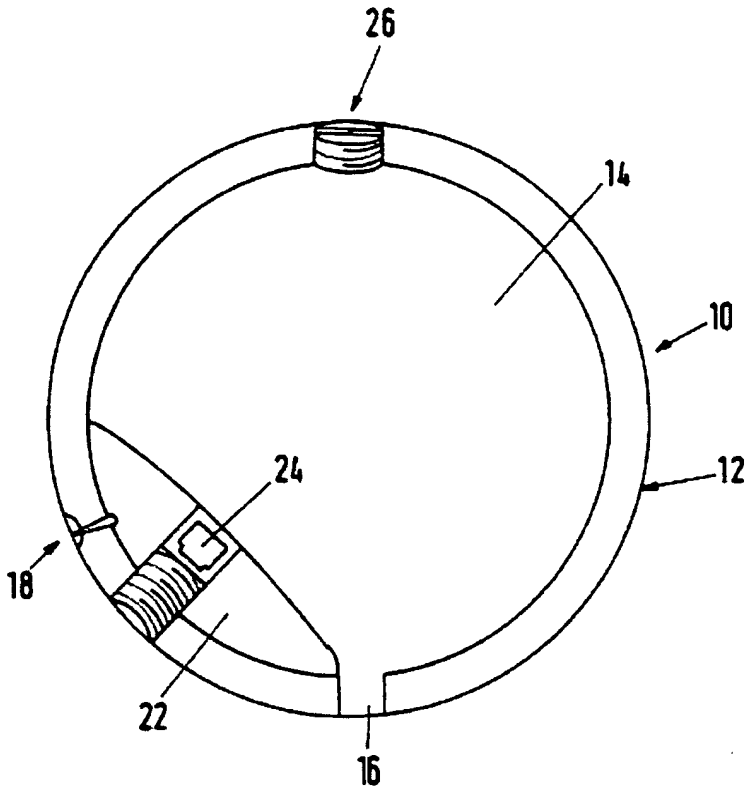
10. Metering device according to one of the preceding claims, characterized in that the power supply device (24) includes at least one thermoelement for supplying power.

11. Metering device according to one of the preceding claims, characterized in that the power supply device (24) includes a mechanical, swinging armature generator.

12. Metering device according to one of the preceding claims, characterized in that the metering device (10) includes a device for determining the water hardness.

13. Metering device according to one of the preceding claims, characterized in that the housing (12) is spherical in form.

Fig.1



INTERNATIONAL SEARCH REPORT

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A. CLASSIFICATION OF SUBJECT MATTER
IPC 6 D06F39/02 D06F39/00

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 6 D06F

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	FR,A,2 455 648 (LICENTIA PATENT-VERWALTUNGS-GMBH) 28 November 1980 see the whole document ---	1,4-7,12
A	WO,A,89 10445 (HENKEL KOMMANDITGESELLSCHAFT AUF AKTIEN) 2 November 1989 see claim 1; figure 1 ---	1,2,13
A	US,A,3 215 311 (M. NISON ET AL) 2 November 1965 see claim 1; figure 1 ---	1,2,6,13
A	EP,A,0 315 879 (COLGATE-PALMOLIVE COMPANY) 17 May 1989 see claims; figures -----	1,3,8,9

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Name and mailing address of the ISA	Authorized officer
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INTERNATIONAL SEARCH REPORT

Information on patent family members

Inter national Application No
PCT/DE 96/01545

Patent document cited in search report	Publication date	Patent family member(s)		Publication date
FR-A-2455648	28-11-80	DE-A-	2917859	13-11-80
		GB-A-	2052251	28-01-81
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